

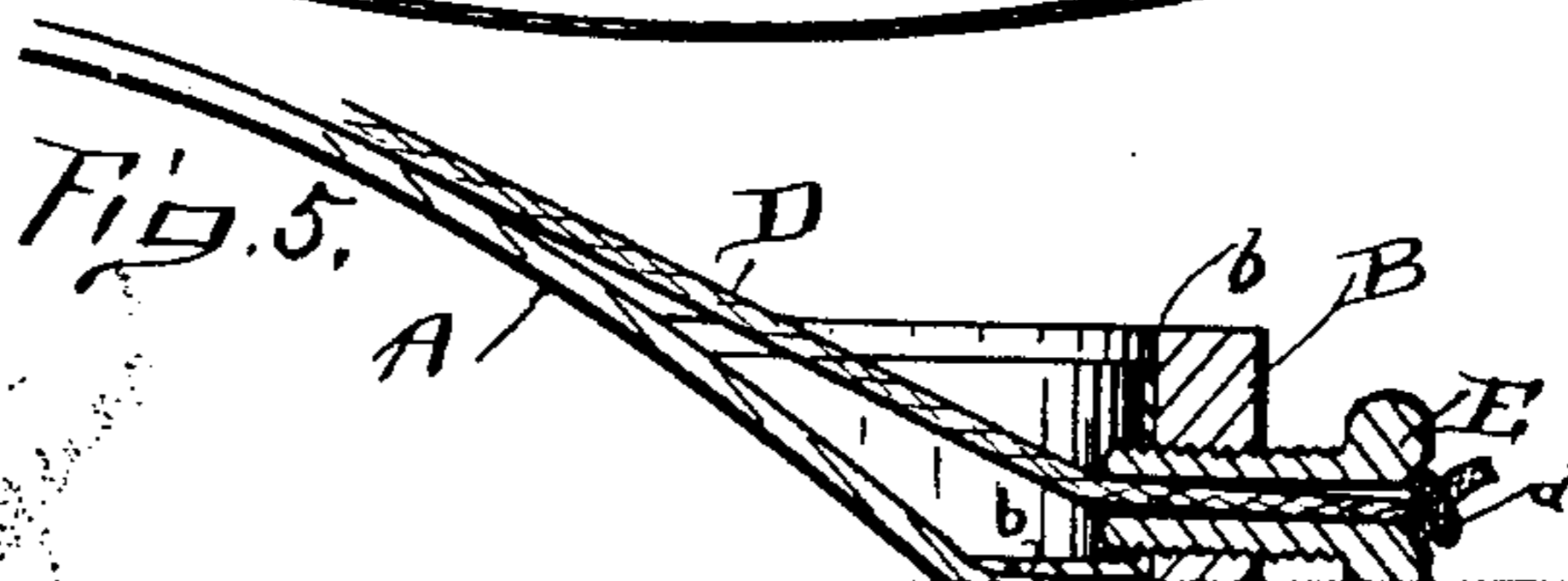
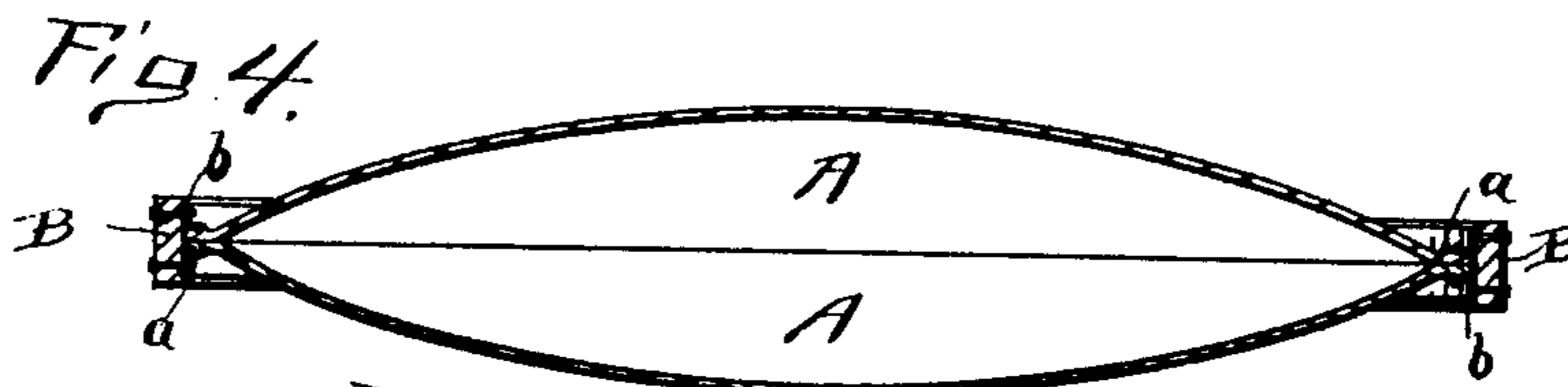
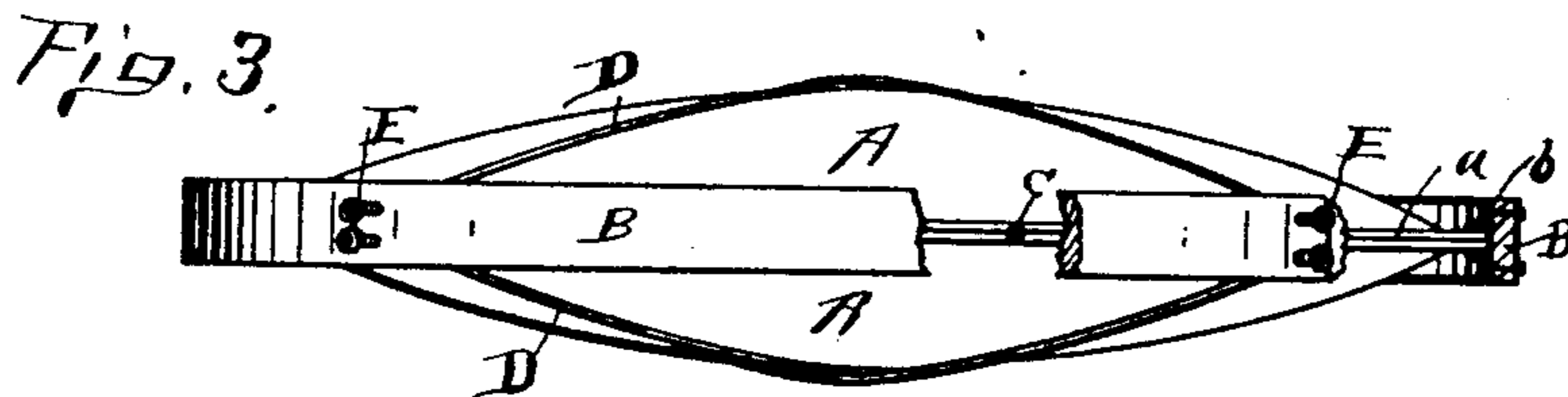
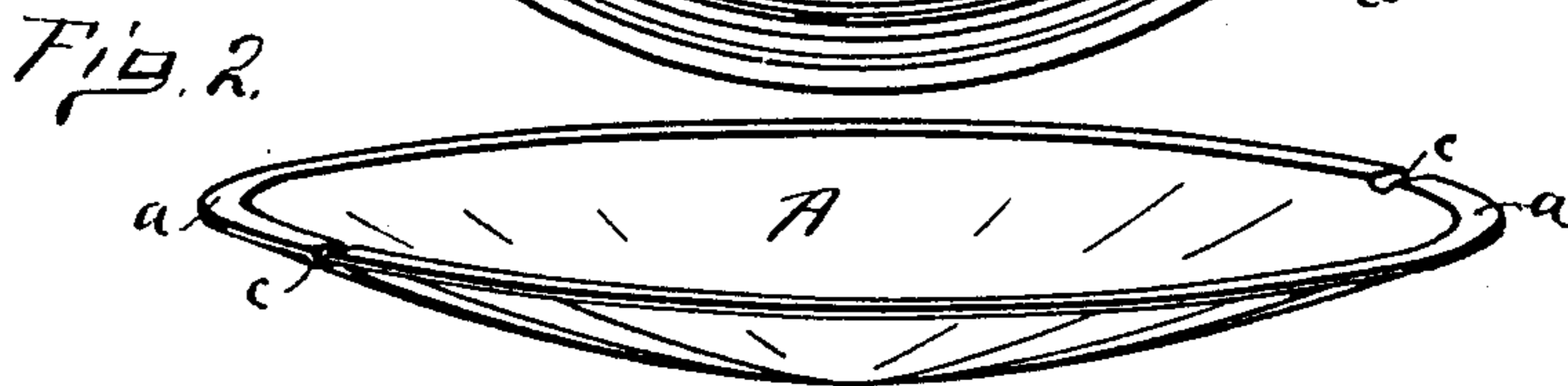
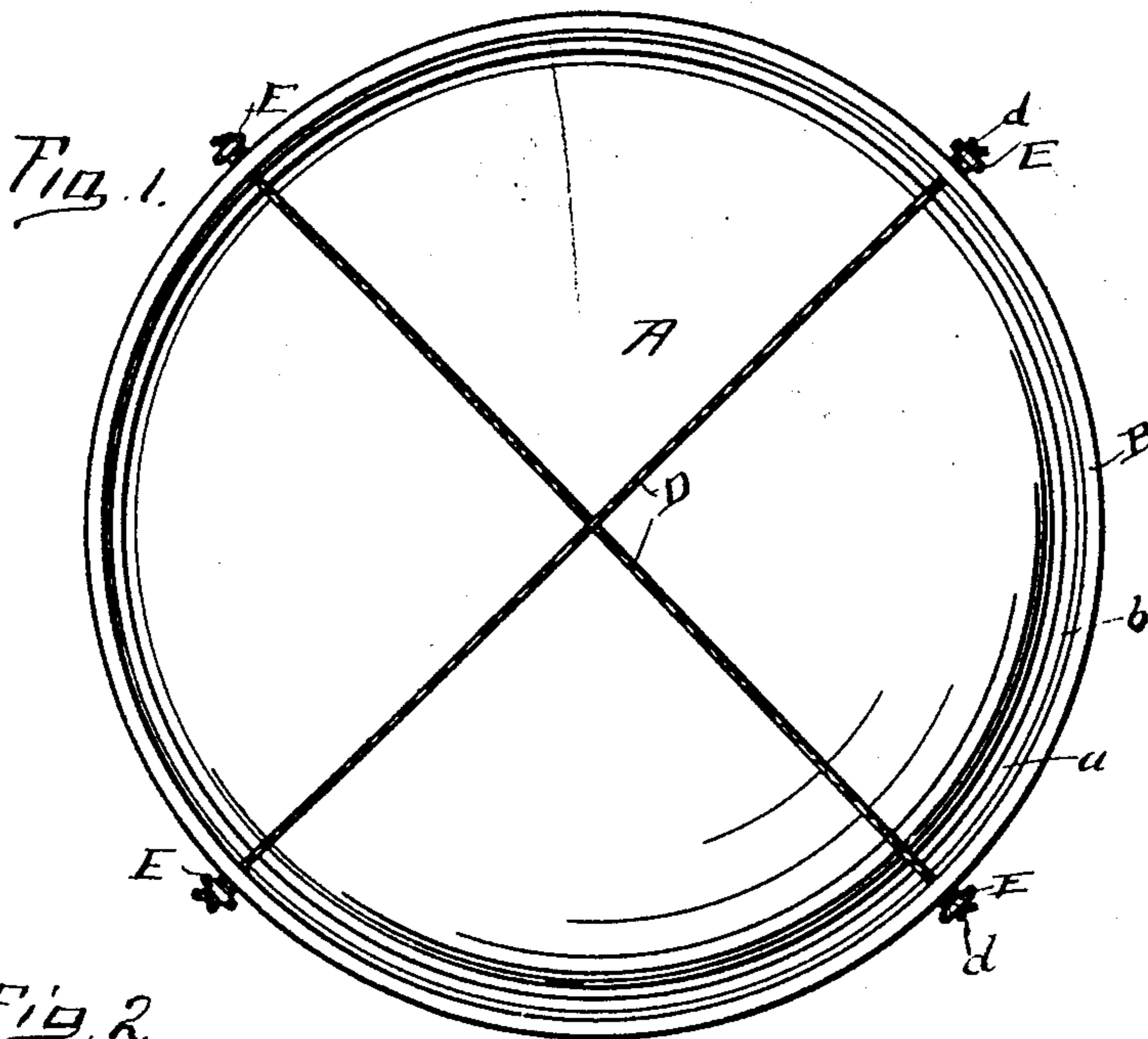
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A. A. INGRAM.  
FLUID LENS.

No. 509,379.

Patented Nov. 28, 1893.

T2014



WITNESSES:  
S. J. CROSS

INVENTOR:

# UNITED STATES PATENT OFFICE.

ARNOLD A. INGRAM, OF WOOSTER, OHIO.

## FLUID LENS.

SPECIFICATION forming part of Letters Patent No. 509,379, dated November 28, 1893.

Application filed January 26, 1893. Serial No. 459,818. (No model.)

*To all whom it may concern:*

Be it known that I, ARNOLD A. INGRAM, a citizen of the United States, residing at Wooster, in the county of Wayne and State of Ohio, have invented certain new and useful Improvements in Fluid Lenses; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters of reference marked thereon, in which—

Figure 1, is a side view showing all of the different parts properly located. Fig. 2, is a detached view of one of the lens sections. Fig. 3, is an edge view showing the location of the lens sections, also illustrating the position of their retaining band, showing the said retaining band broken for the purpose of better illustrating the different parts. Fig. 4 is a view showing a diametrical section of the band, designed to hold the lens and illustrating a section of the lens and its flanges. Fig. 5, is a view showing portions of the lens, and a sectional view of the wire-retaining screws, said parts being shown somewhat out of proportion for the purpose of better illustrating the location of the different parts.

The present invention has relation to fluid lenses, and it consists in the different parts and combination of parts hereinafter described.

Similar letters of reference indicate corresponding parts in all the figures of the drawings.

In the accompanying drawings A represents the lens sections which are formed in pairs and of glass, and are substantially of the form shown in the drawings, and as shown, their meeting faces are circular, the sections proper being convexo concave. The meeting faces of the lens A, terminate in the flanges *a*, which flanges are provided with plain smooth surfaces, and are so formed for the purpose of bringing the meeting faces of the flanges into close and true contact with each other.

For the purpose of hermetically sealing the lens sections A, cement may be used to unite the flanges *a*, together, which securely unites the lens sections A.

For the purpose of assisting in holding the lens sections in proper position, and at the same time protecting and guarding the pe-

ripheries of the sections A, and their flanges *a*, the metallic band B is provided, which metallic band is formed of sufficient size and strength to hold the sections together. It will be understood that the size of the band B, will correspond with the size of the lens sections A.

For the purpose of assisting in holding the flanges *a*, of the lenses A, the L-shaped disks or bands *b* are provided, which L-shaped bands are located against the inner periphery of the band B, and the outer faces of the flanges *a*, except that a pliable or yielding disk may be placed between the flanges *b*, and the flanges *a*, thereby to a certain extent protecting the glass.

For the purpose of relieving the lenses A, from the pressure brought to bear against them by the liquid contained within the lenses, the wires D, are provided, which wires cross the lenses diametrically as indicated in Fig. 1.

For the purpose of adjusting the tension of the wires D, the screws E, are provided, which screws are seated in the metallic band B, substantially as illustrated in Fig. 5.

For the purpose of filling the lenses, the notches or recesses *c* are formed in the flanges *a*, and are so located that when a pair of lenses are properly placed together, said notches will come directly opposite each other, thereby providing a filling aperture.

For the purpose of removing the liquid from a lens, two apertures should be formed, one being designed for an outlet, and the other atmospheric.

It will be understood that by my peculiar manner of forming the lens the sections composing the lens can be pressed or formed by means of dies, and of any desired diameter, thereby forming a true lens, which can be formed much larger in diameter than under the old way of forming the lens of solid glass, inasmuch as by the means of dies, the sections can be pressed to uniform thickness throughout and with true surfaces.

It will be understood that the lens proper is to be filled with transparent liquid, which may be alcohol or it may consist of a composition of different ingredients. The screws E, are formed hollow as illustrated in Fig. 5, and the wires D, passed through said screws, thereby forming a means for bringing said screws to or from a common center.

For the purpose of preventing the wires D, from slipping through the opening through screw E, a knot or its equivalent such as *d*, may be formed upon the ends of the wires D. 5 It will also be understood that the wires D, should be fine, reference being had to the strength of the wire.

Having fully described my invention, what I claim as new, and desire to secure by Letters 10 Patent, is—

1. In a fluid lens, the sections A formed convexo concave in radial cross section provided with the flanges *a*, having smooth flat surfaces, with the smooth flat surfaces hermeti- 15 cally sealed together, the metallic band B, located upon the peripheries of the flanges *a*, the L-shaped bands *b*, located upon the inner

peripheries of the band B, and upon opposite sides of the flanges A, substantially as for the purpose described.

2. In a fluid lens, the combination of sections formed convexo concave, and provided with flanges and a metallic ring at the peripheries of the flanges, the h screws E, and the wires D, substantially and for the purpose described.

In testimony that I claim the above I hereunto subscribed my name in the presence of two witnesses.

ARNOLD A. INGRA

Witnesses:

JAMES STERLING,  
F. W. BOND.